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In the Supreme Court of the United States

FEDERAL ENERGY REGULATORY COMMISSION,
Petitioner,

v.

ELECTRIC POWER SUPPLY ASSOCIATION, *et al.*,
Respondents.

ENERNOC, INC., *et al.*,
Petitioners,

v.

ELECTRIC POWER SUPPLY ASSOCIATION, *et al.*,
Respondents.

On Writs of Certiorari to the United States Court of Appeals for the D.C. Circuit

BRIEF OF *AMICUS CURIAE* CHARLES J. CICCHETTI IN SUPPORT OF PETITIONERS

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INTEREST OF AMICUS[1]

Charles J. Cicchetti, Ph.D has spent his long career as an academic and regulator developing ways to make the provision of electricity more efficient and cost-effective. Since the early 1970s, he has advocated for increasing the extent to which market mechanisms guide resource allocation and price specification. He has proposed and supported policies that replace regulation with competition, with particular emphasis on increasing customer choices and encouraging competitive market entry on a level playing field.

Dr. Cicchetti's career has included positions as a Professor of Economics and Environmental Studies at the University of Wisconsin, Chairman of the Wisconsin Public Service Commission, Deputy Director of the Energy and Environmental Policy Center at Harvard University's John F. Kennedy School, and the Jeffrey and Paula Miller Chair of Government, Business and Economics at the University of Southern California. His most relevant publications include: *Perspective on Power: A Study of the Regulation and Pricing of Electric Power*, published in 1974; *The Marginal Cost and*

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[1] As required by Supreme Court Rule 37.6, amicus states that no counsel for a party authored this brief in whole or in part, and no counsel or party made a monetary contribution intended to fund the preparation or submission of this brief. Pursuant to Supreme Court Rule 37.3(a), amicus curiae states that all parties have consented in writing to the filing of this brief.

Pricing of Electricity, published in 1977; *Including Unbundled Demand-Side Options in Electric Utility Bidding Programs* (an article co-authored with William W. Hogan), published in 1989; *Restructuring Electricity Markets*, published in 2003; and, *Going Green and Getting Regulation Right*, published in 2009. Over the past forty-five years, he has also testified before state, federal, and international energy regulatory commissions about how to promote economic efficiency and competition while also promoting cost causality, marginal cost, and beneficiaries pay pricing.

Dr. Cicchetti's interest in the Federal Energy Regulatory Commission ("FERC" or the "Commission")'s Order No. 745, *Demand Response Compensation in Organized Wholesale Energy Markets* ("Order 745" or "the Order"), has been and continues to be that of an unaffiliated observer with deep expertise regarding how best to increase competition in electricity services markets and thereby improve consumers' access to abundant and affordable energy resources. He submitted two sets of written comments in FERC's Order No. 745 proceedings without a client or outside financial support. With this amicus brief, Dr. Cicchetti continues to participate on his own behalf and not on behalf of industry players, environmental advocates, or any other organization or entity.

The case before the Court addresses, in part, whether Order 745 stands on firm economic ground. Dr. Cicchetti's explanation of the economic principles and logic underlying the Order's

instructions to wholesale electricity market participants will aid the Court by articulating the logical steps that link generally accepted economic fundamentals to the particular features of FERC's Order.

SUMMARY OF ARGUMENT

Amicus curiae submits this brief to assist the Court in understanding the sound economic reasoning that informed the level of compensation specified in Order 745. This brief leaves aside the jurisdictional question posed by the Court and addresses whether the Court of Appeals for the D.C. Circuit erred in holding that Order 745 is arbitrary and capricious. In particular, this brief focuses on a narrow aspect of that question: whether, according to economic principles, FERC reasonably concluded that the locational marginal price ("LMP") is the appropriate level of compensation for demand response resources dispatched in FERC-authorized wholesale markets where LMP satisfies the buyers' cost-effectiveness criterion set forth in the Order. It endorses FERC's reasoning and also its conclusion, namely that compensating demand response resources as Order 745 instructs will foster both economic efficiency and energy efficiency—and that failing to do so will impede market and operational efficiencies, and thereby pull wholesale rates away from what is just and reasonable. Amicus presents this brief to demonstrate that FERC's economic reasoning regarding compensation for dispatched demand

response resources in wholesale markets after satisfying a buyers' cost-effectiveness criterion is consistent with accepted economic principles, and, therefore, that the D.C. Circuit erred in concluding that FERC had failed to justify its Order vis-à-vis counterarguments rooted in economics.

TECHNICAL BACKGROUND

FERC Order No. 745 contains technical instructions to the entities responsible for managing the United States' wholesale electricity marketplaces. Simply put, those instructions direct that wholesale markets should make use of—and pay for—a particular form of electricity curtailment, but only when doing so would save money, or at least not be an additional cost, for buyers in the wholesale market. Because the institutional, physical, and economic background of FERC's Order, and thus of this case, is complex, Amicus precedes its arguments by articulating several terms and concepts that are indispensible to a fluent discussion of FERC's Order. Those descriptions summarize the following: economic efficiency; "just and reasonable" pricing; retail and wholesale electricity; Independent System Operators and Regional Transmission Organizations; locational marginal pricing, "congestion," and "LMP-G"; demand-side management and demand response resources; and "Old LMP," "New LMP," as well as Order 745's "adder" and Net Benefits Test.

Economic efficiency and "just and reasonable" pricing. Several commenters have emphasized the relevance of economic efficiency to FERC's Order. In keeping with the shared view of courts and economists, this brief takes economic efficiency in the regulatory context like the one at issue as broadly equated to "just and reasonable" pricing, such as FERC must maintain in wholesale electricity markets. *See* 16 U.S.C. § 824e(a) ("the Commission shall determine the just and reasonable rate . to be thereafter observed and in force, and shall fix the same by order").

This brief interprets "just and reasonable" as describing outcomes consistent with several regulatory principles: "cost causality," "beneficiary pays," and "no unjustified price discrimination."[2] Cost causality broadly means maintaining prices that allocate costs introduced into a system to the party or parties responsible for introducing them. Similarly, the "beneficiary pays" principle holds that costs arising from a given investment or approach should be allocated to those who benefit as a result. *See S. Carolina Pub. Serv. Auth. v. FERC*, 762 F.3d 41, 87 (D.C. Cir. 2014) ("The cost causation principle requires costs to be allocated to those who cause the costs to be incurred and reap the resulting benefits.") (internal quotations

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[2] *See generally* James C. Bonbright, Principles of Public Utility Rates, Ch. XIX (1961); *see also* Charles J. Cicchetti, Jeffrey Dubin & Colin Long, The California Electricity Crisis: What, Why, and What's Next (2004) (discussing these principles in the context of recent events).

omitted); *Illinois Commerce Comm'n v. FERC*, 576 F.3d 470, 476 (7th Cir. 2009) ("To the extent that a utility benefits from the costs of new facilities, it may be said to have 'caused' a part of those costs to be incurred, as without the expectation of its contributions the facilities might not have been built, or might have been delayed."). Finally, preventing unjustified price discrimination means ensuring that prices assigned to a product or service do not vary for reasons other than differences in costs, and in how well that product or service satisfies consumer demand in a particular market or regulatory context. Prices that satisfy these three principles should be considered just and reasonable.[3] Price reduction subsidies can, however, sometimes be justified when the party that pays the subsidy is left better off because she ultimately pays a lower price than she would otherwise, even after paying to provide the subsidy.

Retail and wholesale electricity. Broadly speaking, electricity generators sell their product wholesale, where it is purchased by entities (chiefly utilities and competitive retail energy service providers) that then resell it to end-users at retail. Electricity sold at retail generally flows to end-users through distribution systems. Utilities' delivery of electricity to retail customer premises is mostly treated as a natural monopoly, which is granted an exclusive franchise in exchange for accepting comprehensive state regulation of prices

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[3] *See* Bonbright, *supra* note 2, at 291.

charged, profits, and terms of service.[4] Traditionally, most electric utilities have owned electricity generation and transmission facilities, and states' public utility commissions have regulated these vertically integrated utilities within their borders.[5]

FERC regulates the wholesale electricity tariffs that determine the price of electricity generation and transmission services sold to utilities and others (but almost never end-users) at wholesale. *See* 16 U.S.C. § 824e(a). Prior to passage of the Public Utility Regulatory Policy Act of 1978 ("PURPA"), Pub. L. No. 95–617, 92 Stat. 3117, FERC's role was mostly limited to sales between utility companies and interstate affiliates. PURPA established independently owned power generation as a viable source of competition to traditional, vertically owned utilities. Pushed by PURPA, as well as the Energy Policy Act of 1992, Pub. L. No. 102-486, 106 Stat. 2776, and ongoing technological changes, FERC has since steered the evolution of wholesale electricity markets to accommodate still more competition for supplying the electricity, transmission, and ancillary services needed to insure reliable and efficient outcomes in the bulk power system. *See New York v. FERC*, 535 U.S. 1, 6–13 (2002) (describing congressionally mandated

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[4] *See generally* Scott Hempling, Regulating Public Utility Performance: The Law of Market Structure, Pricing and Jurisdiction, 14–30 (2013).

[5] *Id.* at 14–15.

and FERC-led changes to wholesale markets in 1990s).

The competitive wholesale markets established by FERC are designed to replace the traditional cost plus return regulatory model (known as "cost of service") with a model designed to establish electricity prices based on the interaction of demand and supply.[6] Competitive markets dispatch "least cost" supply resources by calling only on the least expensive available generating units and transmission pathways, i.e. those with the lowest marginal operating costs. The supply of electricity services in this market-based model is thus conceptually the same as the least cost marginal operating cost curve, which prioritizes supply resources from those with the least to the greatest marginal costs. It follows that, if demand increases, market prices also increase, because the resources dispatched to meet that demand have higher marginal operating costs.

Independent System Operators ("ISOs") and Regional Transmission Organizations ("RTOs"). The chief subjects of FERC's wholesale market regulatory efforts are ISOs and RTOs.[7] These

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[6] While conceptually straightforward, operational complications also require ISO/RTOs to establish other distinct products known as ancillary services, which improve system reliability, reduce congestion, and improve the efficiency of wholesale market operations.

[7] Orders 888 and 890, which define the roles of ISOs and RTOs, are codified at 28 CFR pts. 35 and 37. Order No. 888, Promoting Wholesale Competition Through Open Access Non-

entities—referred to hereafter as ISO/RTOs—can be thought of as combining the role of air traffic controllers and a stock exchange for regional segments of the interstate bulk power system. They conduct wholesale market auctions among generators, transmission facility owners, buyers (chiefly retail utilities), and others; these auctions establish wholesale market prices. ISO/RTOs also maintain from moment-to-moment the regional balance between the supply of electricity and aggregate end-user demand or "load." Over the past thirty years, FERC has issued numerous Orders to ISO/RTOs instructing them to accommodate and encourage competition, including by incorporating new products and services into wholesale markets. Some states continue to employ comprehensive traditional cost of service regulation. Nevertheless, in significant swaths of the country, the utilities they regulate typically also participate in the FERC-regulated wholesale electricity and transmission markets. Accordingly, the electric industry in the United States is currently governed by both FERC and state utility regulators.

The Locational Marginal Price ("LMP"), "congestion," and "LMP-G" Entities that supply generating resources to wholesale markets for

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Discriminatory Transmission Services by Public Utilities; Recovery of Stranded Costs by Public Utilities and Transmitting Utilities, FERC Stats. & Regs ¶ 31,036, 61 Fed. Reg. 21,540 (1996), *aff'd in relevant part sub nom. New York v. FERC*, 535 U.S. 1 (2002); Order No. 890, Preventing Undue Discrimination and Preference in Transmission Service, FERC Stats. & Regs ¶ 31,241, 72 Fed. Reg. 12,266 (2007).

electric energy, capacity, and ancillary services receive a market-clearing price, often called LMP, in compensation. ISO/RTOs, with approval from FERC, specify the parameters for qualifying resources. LMP thus reflects the marginal cost of supplying an additional increment of a qualifying resource at a particular location and point in time. LMP varies as competing suppliers bid units into the market to satisfy demand. All generators that supply a particular market or particular node or location within a market are paid the same market-clearing prices.

Transmission line network "congestion" sometimes affects LMP. Congestion refers to the result of network constraints that restrict end-user access to some supply resources beyond particular locations or nodes. Network congestion causes LMP to exceed the price for similar resources elsewhere in the broader competitive market. By boosting LMP, congestion also encourages several types of investment: by transmission line owners in additional transmission capacity; by suppliers in more generation; and by consumers in the form of substitutes for the resources supplied via congested network lines. Such responsive investments ensure that LMP continues to be "just and reasonable" and reflective of cost causality, beneficiary pays, and no unjustified discrimination principles.

LMP minus G, or "LMP-G," uses "G" as shorthand to describe the portion of what retail consumers pay to utilities, often on a volumetric basis, to cover the costs of electricity generation

and transmission. The remaining costs that customers pay for retail electricity include, chiefly, those arising from the maintenance and operation of distribution infrastructure. As explained in subsequent sections of this brief, G is also used to refer to costs avoided by retail consumers who curtail their electricity usage.

Demand Side Management ("DSM") and Demand Response Resources ("DRR"). DSM describes various approaches that curb demand for electricity or "load." (Units of DSM are sometimes called "negawatts" to convey that they are conceptually the inverse of megawatts of electricity.[8])

DSM encompasses passive conservation or energy efficiency, which allows electricity users to do what they normally do in terms of space conditioning, appliance and machinery use, lighting, etc. while using less electricity. Passive DSM thus includes installing energy efficient equipment, improving insulation, and similar measures. DSM also encompasses active reductions or curtailment in use in response to relative prices, congestion, reliability, and external conditions. End-use electric customers can control their own load in response to such factors; more likely, such customers' utility or a third-party electric services

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[8] The term was famously coined by Amory Lovins. Amory B. Lovins, *Saving Gigabucks with Negawatts*, 115 Pub. Utilities Fortnightly, Mar. 21, 1985, at 24; *see also* Amory B. Lovins, *The Negawatt Revolution*, Conf. Bd. Mag., Sept. 1990.

provider will provide load control or active energy efficiency services.[9] The particulars of such active DSM, arrangements (referred to herein as demand reduction), vary, but they generally entail residential, commercial, and/or industrial end-users receiving price discounts or other compensation in return for giving up the unrestricted ability to use however much electricity they want at any point in time.[10]

Dispatchable demand reduction is a specific type of active DSM that allows ISO/RTOs to determine when to employ or "dispatch" a reduction in load instead of additional units of electricity in order to maintain the balance between electricity and load. Order 745 is concerned only with this

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[9] *See, e.g.*, Girish Ghatikar et al., Lawrence Berkeley Nat'l Lab'y, Analysis of Open Automated Demand Response Deployments in California and Guidelines to Transition to Industry Standards, LBNL-6560E, 4–14 (Jan. 2014) (describing examples of DRR arrangements managed by utilities or third-party energy service providers in California); Peter Cappers et al., Lawrence Berkeley Nat'l Lab'y, Market and Policy Barriers for Demand Response Providing Ancillary Services in U.S. Markets, LBNL-6155E, at 22–26 (Mar. 2013) (describing entities and arrangements involved in active demand reduction provision more generally).

[10] *See* M.A. Pietter & E. Koch, Lawrence Berkeley Nat'l Lab'y, Direct Versus Facility Centric Load Control for Automated Demand Response, LBNL-2905E, at 1 (Nov. 2009) ("Much of DR today is managed as a set of programs in which the participants enter into some contractual agreement about how they will get compensated by participating in the DR Events"); *see also* Mahdi Behrangrad, *A Review of Demand Side Management Business Models in the Electricity Market*, 47 Renewable & Sustainable Energy Reviews 270 (2015).

specific type of active demand reduction, which, following the lead of the U.S. Department of Energy, it calls a "demand response resource," or DRR. Pet. App. 54a (citing 18 C.F.R. pt. 35.28(b)(5)).

"Old LMP," "New LMP," and the "adder." In its initial Notice of Proposed Rulemaking for Order 745, FERC recognized that dispatchable DRR could be a cost-effective alternative to electricity supply resources, and that dispatching DRR could cause wholesale markets to clear at a lower LMP.[11] Call this expected lower *ex post* price "New LMP" to distinguish it from the *ex ante* "Old LMP," the equilibrium price if ISO/RTOs dispatch only electricity to clear the market. But FERC also recognized that paying electricity suppliers the New LMP would leave ISO/RTOs without any money to also pay DRR providers, a problematic deficit termed "the billing unit effect." Pet. App. 55a–56a. To make up the deficit, FERC instructed

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[11] Demand Response Compensation in Organized Wholesale Energy Markets, 75 Fed. Reg. 15,362, 15,363–64 (proposed Mar. 18, 2010) [hereafter "NOPR"] (noting comparable applications of dispatchable DRR and downward pressure on prices resulting from its presence in wholesale markets); *id.* at 15,367 ("we ask for comment on whether a reduction in consumption is comparable to an increase in electricity production for purposes of balancing supply and demand"); *see also* Order No. 719, Wholesale Competition in Regions with Organized Electric Markets, 125 FERC ¶ 61,071, 73 Fed. Reg. 64,100, 64,107 (Oct. 17, 2008) (explaining that operational comparability of DRR is part of basis for FERC's determination regarding compensation in wholesale market for ancillary services).

ISO/RTOs to include an "adder" in the price charged to buyers whenever DRR is sold in addition to electricity. That adder would be equal to New LMP multiplied by the volume of dispatched units of demand reduction, then divided by the volume of all the remaining units of electricity sold. Order 745 also instructs ISO/RTOs to allocate the cost of the adder proportionally to all buyers that purchase electricity from the wholesale market during times when ISO/RTOs dispatch DRR. *Id.* at 128a–129a.

The Net Benefits Test. FERC recognized that allocating the adder in this way would only be worthwhile if the combined cost of electricity and dispatched demand reduction would be less than that of electricity at Old LMP *Id.* At times when the combined cost would be more, buyers would have been better off if the ISO/RTO excluded DRR from the wholesale market. FERC's Order answered this concern by imposing a buyers' cost-effectiveness criterion, the Net Benefits Test, on ISO/RTOs' dispatch of DRR. In circumstances where paying Old LMP for electricity would cost less than paying both New LMP and the adder for a mix of electricity and DRR, that DRR fails the Net Benefits Test. In such circumstances, Order 745 does not require ISO/RTOs to dispatch DRR or compensate its provider. Imposing the Net Benefits Test thus ensures that paying for DRR dispatched in wholesale markets would make at least some buyers better off and no buyer would be worse off, because paying the New LMP plus an adder to

compensate dispatched DRR would be less than the Old LMP [12] (This brief refers to this feature of the Net Benefits Test as the "buyers' cost effectiveness criterion.")

The Net Benefits Test can also be understood in terms of what economists call price elasticity, which measures how responsive demand for a product or service is to changes in its price. Demand is "elastic" when it responds disproportionately to a change in price; it is "inelastic" when it responds little or not at all to a change in price. The Net Benefits Test allows or disallows payment for dispatched demand reduction based on the price elasticity of demand in wholesale electricity markets. Thus, ISO/RTOs must exclude dispatched demand reduction from receiving minimum payments via wholesale markets if demand is price elastic—meaning that the percent reduction in the quantity of electricity demanded at New LMP is less than the percent reduction in price from Old to New LMP. Similarly, if electricity supply bids are flat or nearly so when the competitive market clears, there is little potential for New LMP to be lower than Old and the Net Benefits Test would exclude DRR.

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[12] FERC's Order initially calls for a Net Benefits Test based on a rolling monthly procedure that identifies the threshold below which DRR should be excluded from wholesale markets in that month. The Order also provides ISO/RTOs the opportunity to study the impacts of dispatched demand reduction on the underlying ISO/RTO dispatch algorithm, and to propose an alternative to the monthly determination of breakeven LMP prices for DRR. Pet. App. 56a–57a.

ARGUMENT

FERC Order No. 745 specifies how and when ISO/RTOs should compensate active demand reduction that can be dispatched, measured and verified, and the Order explains why those specifications will save some wholesale buyers money without costing any buyer more. FERC arrived at the Order's various specifications after a lengthy series of proposals, comment periods, and a technical conference. As noted above, the crux of FERC's Order is that, when dispatching demand-reducing resources as well as electricity would be cost-effective for wholesale buyers, wholesale markets should compensate providers of dispatched demand reduction at the same price, New LMP, that wholesale markets pay for conventional electricity services.

The D.C. Circuit's opinion offers several reasons for rejecting FERC's Order, all of them wrong. To begin, the opinion insists that FERC should not be allowed to assign the same price to ostensibly dissimilar products. It supports this view with the observation that providers of demand response resources are not "saddled" with the same costs as electricity suppliers. Pet. App. 16a. But this facile reasoning requires mis-defining the product at issue as a physical flow of electrons, rather than defining it accurately as reliable electricity services delivered at just and reasonable prices.

The opinion below also wrongly concludes that FERC did not "engage the arguments raised before it," specifically the argument made by Commissioner Moeller in his dissent that paying LMP for dispatched demand reduction is necessarily "overcompensation," which "cannot be just and reasonable." Pet. App. 16a. This conclusion strangely fails to note two things. First, that numerous commenters and FERC answered these points by describing how dispatched, measured and verified demand reduction *is* operationally comparable to electricity and that its providers are indeed "saddled" with costs, just different ones. Pet. App. 69a–82a, 104a (summarizing commenters' rival arguments regarding comparability and explaining reasons for Commission's final decision).[13] And second, that FERC expressly sought to avoid overcompensating demand reduction dispatched in wholesale markets by modifying its initial proposal and embedding a buyers' cost-effectiveness criterion in the Order's Net Benefit Test. *Compare* NOPR, 75 Fed. Reg. at 15,367 (". paying LMP in all hours to the demand response resources that can participate in the organized wholesale energy markets is the correct approach at this time, "), *with* Order 745, Pet. App. 92a–93a (describing comments received in

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[13] *See also* Affidavit of Alfred E. Kahn at 4–13, attached to Reply Comments of the Demand Response Supporters, FERC Docket No. RM10-17-000 (Aug. 26, 2010) (expressly rebutting arguments of Robert L. Borlick and Professor William W. Hogan that paying LMP amounts to "overcompensation" or "double payment").

response to NOPR and FERC's responsive revisions, including Net Benefits Test). Notably, FERC also required the ISO/RTOs to revisit existing protocols for measuring and verifying DRR dispatched into wholesale markets, and to ensure that these adequately capture the performance, or non-performance of DRR, consistent with the Order's parameters. Pet. App. 124a. For these reasons, FERC's issuance of Order 745 satisfies the relevant standard of review, which requires FERC's Order to be both reasoned and reasonable.[14]

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[14] The Administrative Procedure Act requires FERC to show the Court that its Order was reasonable—meaning that its logic was relevant and sound—and reasoned—meaning that it articulated that logic sufficiently and offered adequate answers to questions and criticisms raised in response. *Am. Paper Inst., Inc. v. Am. Elec. Power Serv. Corp.*, 461 U.S. 402, 413 (1983) ("To decide whether the Commission's action was 'arbitrary, capricious, [or] an abuse of discretion,' we must determine whether the agency adequately considered the factors relevant to choosing a rate that will best serve the purposes of the statute, and whether the agency committed 'a clear error of judgment.' *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416 (1971)."); *Jersey Cent. Power & Light Co. v. FERC*, 810 F.2d 1168 (D.C. Cir. 1987) ("where the Commission has reached its determination by flatly refusing to consider a factor to which it is undeniably required to give some weight, its decision cannot stand.") (citing *Overton Park*, 401 U.S. at 416). *See also* Richard J. Pierce, Jr., *A Primer on Demand Response and a Critique of FERC Order 745*, 3 Geo. Wash. J. Energy & Envtl. L. 102, 108 (2012) ("I agree with Commissioner Moeller's view and would have joined his [dissenting] opinion had I been a member of FERC. Yet, if I were instead a judge reviewing Order 745, I would uphold FERC's rule on the basis that the agency provided reasoning

Most important for this brief's purposes, the D.C. Circuit's conclusion is wrong because sound economic principles—principles on which FERC and other commenters expressly relied when explaining Order 745's logic—do not support Commissioner Moeller's characterization of LMP as "overcompensation" for dispatched demand reduction. Pet. App. 161a–162a (Moeller, Comm'r, dissenting). The following sections explain those principles and the logic that informs Order 745's prescription for compensating cost-effective dispatched demand reduction at LMP.

I. Ordering ISO/RTOs to Compensate Qualifying Dispatched Demand Reduction at New LMP Will Yield Economically Efficient Outcomes for Wholesale Markets.

Competitive markets rely on the interaction of demand and supply to establish an economically efficient market-clearing price; such a price equals the marginal cost of the last unit dispatched to satisfy market demand (i.e., "clear the market"). Suppliers with lower marginal costs receive that price and earn a surplus that economists call economic rent. Comparable or substitute products compete with each other. If the products are comparable and receive the same market-clearing

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adequate to support each step in its decision-making process.").

price, the market will determine how much of each type of product suppliers provide.

Dispatched demand reduction is a proven operational substitute for electric energy in a variety of scenarios.[15] FERC's initial proposal for Order 745 would have treated electricity and dispatchable demand reduction as generally comparable, 75 Fed. Reg. at 15,367, but commenters identified problems with this approach, including the "billing unit effect." In response, FERC narrowed the circumstances in which electricity and dispatched demand reduction would be understood to serve comparable operational *and economic* functions in wholesale markets. Order 745, Pet. App. 94a–95a. Specifically, it instructed ISO/RTOs to allocate the

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[15] *See, e.g.*, Peter Cappers et al., *Demand Response in U.S. electricity markets: Empirical evidence*, 35 Energy 1526 (2010) (describing ISO/RTOs' integration of DRR into wholesale market's menu of supply resources); Rahul Walawalkar et al., *Evolution and Current Status of Demand Response (DR) in Electricity Markets: Insights from PJM and NYISO*, 35 Energy 1553 (2010) (similar); U.S. Dep't of Energy, Benefits of Demand Response in Electricity Markets and Recommendations for Achieving Them (Feb. 2006); *see also* Order 745-A, Pet. App. 211a–212a ("While we agree that [DRR] do[es] not create electricity that can be used to serve load, that fact is not dispositive here. Because the balancing of generation and load when clearing the RTO and ISO day-ahead and real-time energy markets can be accomplished by changes in either supply or demand, demand response resources that clear in the day-ahead and real-time energy market should receive the same market-clearing LMP as compensation when those resources meet the conditions established in the Final Rule . . . .").

adder across all buyers, and to dispatch and compensate dispatched demand reduction only after determining—using the Net Benefits Test—that doing so would be a more economical operational non-discriminatory choice than dispatching generation that is more expensive, i.e. that has a higher marginal operating cost. *Id.*

In keeping with competitive market principles, dispatched, measured and verified DRR that can substitute operationally and economically for electricity should enter the wholesale market whenever its marginal cost is less than the marginal cost of supplying electricity. Similarly, DRR should not be dispatched if its marginal cost exceeds that of supplying electricity. The price that will achieve an economically efficient mix of electricity and DRR is, therefore, New LMP, which reflects the marginal cost of electricity in a competitive wholesale market when dispatchable demand reduction is available.[16] Order 745 establishes these parameters to ensure that an operationally comparable service receives economically comparable compensation.

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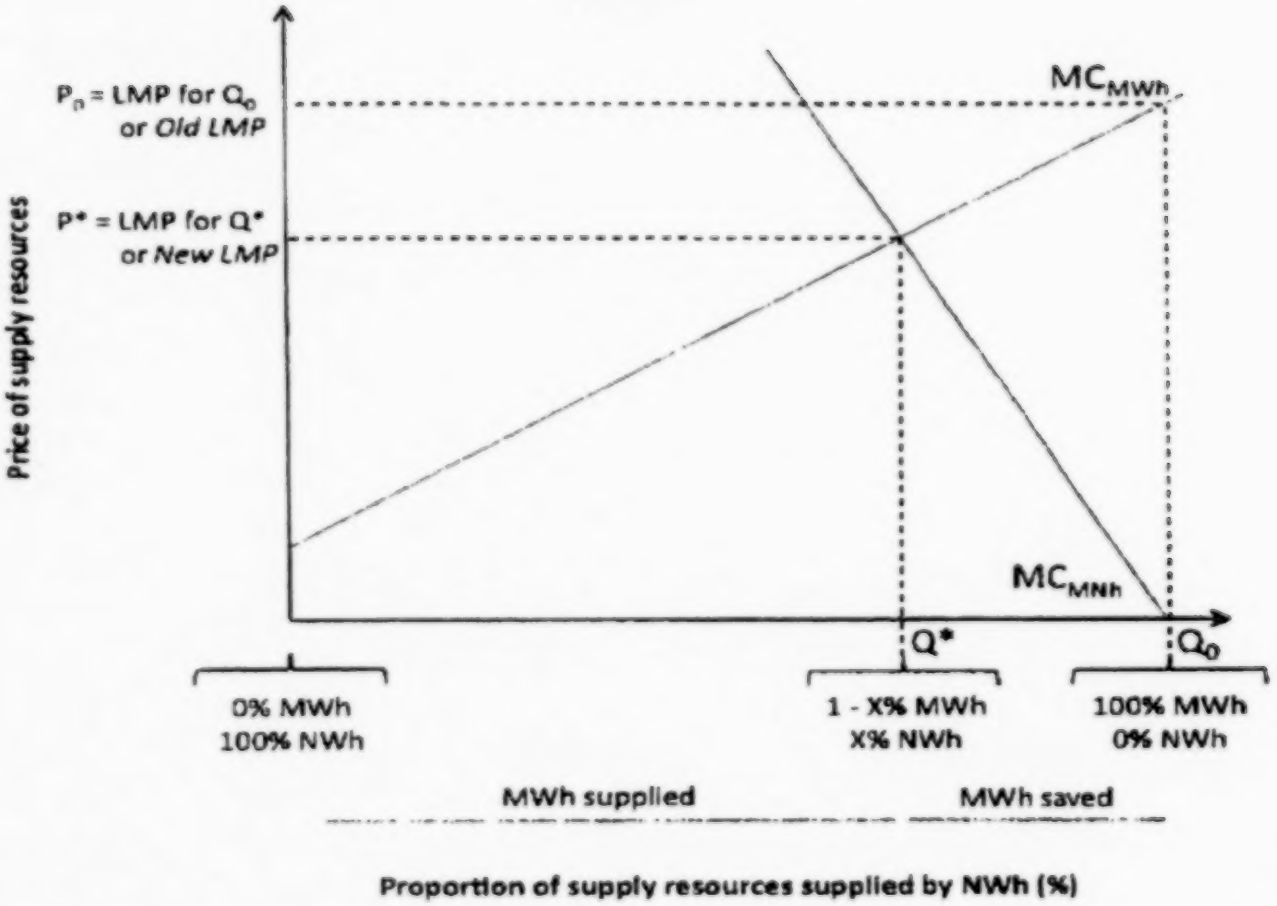
[16] *See* Bonbright, note 2, *supra*, at 174 ("While rate structure regulation is complex, there is general agreement that charging different rates when (marginal) costs are identical is discriminatory.").

Figure 1


P_0 = LMP for Q_0
or *Old LMP*
P* = LMP for Q*
or *New LMP*
Price of supply resources
MC_{MWh}
MC_{MNh}
Q*
Q_0
0% MWh
100% NWh
1 - X% MWh
X% NWh
100% MWh
0% NWh
MWh supplied
MWh saved
Proportion of supply resources supplied by NWh (%)

The diagram shown in Figure 1 above helps to explain these points by depicting the workable economic tradeoff contemplated in Order 745 between electricity and DRR. That Figure refers to a unit of electricity as a megawatt hour ("MWh"); and to a unit of demand reduction as a "negawatt" hour ("NWh"). This simplified conceptual approach assumes that the amounts of supply-side megawatt hours and demand-side negative megawatt hours—negawatt hours—change in response to the amount of each substitute that the ISO/RTO dispatches. With more electricity supply, the marginal cost of electricity, (labeled "MC_{MWh}" in Figure 1), increases. Increasing amounts of negawatt hours also have increasing marginal costs, (labeled "MC_{NWh}"). The increases in electricity are measured from left to right, and *vice versa* for negawatts.

Figure 1 shows in percentage terms the optimal mix of the operational substitutes, megawatt and negawatt hours, that ISO/RTOs would dispatch to achieve operational and economic efficiency. With no DRR available and thus no negawatts, the market would be 100% electricity dependent and the price would be P_o, or Old LMP. As the percentage share of negawatt hours increases, the price of electricity declines to New LMP The optimal mix occurs when the marginal cost schedules intersect and New LMP equals the market-clearing price, P^* The optimal percent of the market that relies on electricity, or megawatt hours, then shrinks by X% to 1 – X%.

New LMP, or P^*, corresponds to the new market price based on the reduced quantity of electricity needed to clear the market at times when negawatts are admitted into the marketplace. As negawatt hours are sold in the wholesale market, the initial demand for megawatt hours falls by X%. Order 745 requires the ISO/RTO to pay DRR providers New LMP for each negawatt hour sold. Thus, when negawatts are available, wholesale electricity buyers pay a combined amount for megawatt and negawatt hours equal to P^*Q_O. Order 745's Net Benefits Test limits such transactions to circumstances where customers' aggregated savings from the lower New LMP exceed the aggregate amount paid to DRR providers.[17]

Consider the following illustrative example of how pricing these substitutes at New LMP—subject to Order 745's requirements that the demand reduction substitute product be dispatchable and satisfy the Net Benefits Test—would yield an efficient outcome. FERC authored this implementation of the logic depicted in Figure

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[17] The results of including cost-effective DRR are as follows: wholesale electricity consumers save $(P_O - P^*)Q_O$ before paying for DRR; generators receive P^*Q^* (instead of P_OQ_O) for the reduced volume of megawatt hours they supply; and DRR providers receive $P^*(1 - X\%)Q_O$ for their negawatt hours. The payment for DRR would then be added to the New LMP, or P^*, with the condition that the combined payment would always be less than P_OQ_O. Generators also avoid the costs related to the production of Q_O minus Q^*.

1; it appears in Order 745's footnote 119, Pet. App. 94a.

Assume that:

- In the absence of DRR, buyers would pay for 100 megawatts of load in a specific hour at an Old LMP of $50 per megawatt hour; thus, buyers would pay $5,000 for 100 megawatts;
- But 5 megawatts of DRR is dispatched, and its providers and the suppliers of the remaining 95 megawatts of electricity are paid a New LMP of $40 per megawatt hour.

It follows that:

- Electricity suppliers will be paid $40 x 95 megawatts, or $3,800;
- DRR providers will be paid $40 x 5 megawatts, or $200;
- Buyers, therefore, pay $4,000 ($3,800 + $200) to clear the market;
- The adder imposed by Order 745 equals ($40 x 5 megawatts) / 95 megawatts, or $2.11 per megawatt;
- Thus, the unit price of electricity (New LMP) plus the adder equals $42.11 per megawatt or negawatt hour, less than the Old LMP of $50 per megawatt hour.

The Net Benefits Test is satisfied and economic efficiency improved in this example

because buyers would pay less for a reduced volume of electricity and the adder that compensates providers of dispatched DRR—$42.11 per megawatt or negawatt hour—than for electricity and no DRR—$50 per megawatt hour. Put another way, there are no losers among electricity *buyers* here. Wholesale market prices and economic rents decline. This result signals that dispatched, measured and verified demand reduction is economically more efficient, i.e. has lower costs, than relying exclusively on electricity, some of which has higher marginal costs. This illustration also helps to show how imposing the Net Benefits Test ensures that no wholesale market buyer would pay more than they would in the absence of DRR, and that whenever dispatched demand reduction enters the market buyers of wholesale electricity will pay less.

Providers of dispatched, measured and verified DRR, like electricity generators, may earn economic rent. One role of economic rent in a competitive market is to signal opportunities for entry by new sources of supply. The level of rent and rate of entry in a given market reflect that market's efficiency: in an efficient market, slower rates of entry should attend resources with lower expected economic rents, and faster rates of entry should attend resources with higher expected rents. Paying LMP for DRR that satisfies Order 745's parameters, as well as for electricity, ensures economically efficient results, in both the short term, and over time as market actors adjust by

investing in the means to supply an economically more optimal mix of megawatt and negawatt hours.

In sum, DRR cannot be overcompensated, if it is both operationally comparable to electricity and the result of its dispatch is a lower market-clearing price. Importantly, FERC's Order narrowly defines the eligible DRR product to be limited to DRR that can be dispatched, measured and verified. The Order also requires such DRR to satisfy the Net Benefits Test, which prohibits the dispatch of DRR that is not cost-effective from a buyer's perspective and limits the payment of New LMP in the wholesale market to DRR resources with marginal costs that are less than those of resources that would have been paid Old LMP Accordingly, Order 745's implementation cannot result in overcompensation for electricity or the DRR product.

II. Ordering ISO/RTOs to Compensate All Dispatched Demand Reduction at a Price Equal to "LMP-G" Would Yield Economically Inefficient Outcomes for Wholesale Markets.

Some have argued that the correct level of compensation for DRR is not LMP, but LMP reduced by an amount equal to costs a retail end-user avoids when that user "supplies" demand reduction to a DRR provider by not purchasing electricity. Order 745, Pet. App. 161a–165a (Moeller dissent); 99a–100a ("Another issue raised by a number of commenters, largely representing

generators, is whether a lower payment based on LMP-G is the economically-efficient price that sends the proper price signal to a potential demand response provider."). These critics suggest that the generation and transmission portions of a retail tariff, symbolized as "G," best approximate those avoided costs. Not reducing LMP by G, they say, would result in DRR providers being "paid twice," once when they avoid paying the retail rate for electricity by curtailing usage, and "again" when they receive LMP from an ISO/RTO for doing so. *Id.* at 162a–163a (Moeller dissent), 73a–74a ("As described by Dr. William W. Hogan on behalf of EPSA, this is sometimes called a double-payment for demand reductions, because demand response providers would 'receive' both the cost savings from not consuming an increment of electricity at a particular price, plus an LMP payment for not consuming that same increment of electricity.").

Compensating DRR at LMP-G is economically inefficient and thus inferior to FERC's chosen approach, namely allocating the adder to all buyers and restricting compensation of DRR by imposing the Net Benefits Test before dispatching cost-effective demand reduction products in wholesale markets. Before turning to the economic reasons for this inferiority, the Court should take note of two points not related to pricing. First, LMP-G was proposed chiefly as a way to address concerns about paying more for dispatched DRR

than would be saved by dispatching it.[18] And second, FERC considered and rejected LMP-G in favor of superior alternatives for dealing with that concern, and explained its reasons for that choice. Pet. App. 100a–104a (explaining rejection of various arguments offered in favor of LMP-G); *see also id.* at 93a–95a (describing "the net benefits test through which [the billing unit affect] is addressed"). That is, contrary to the D.C. Circuit's statement that "FERC failed to properly consider—and engage—Commissioner Moeller's reasonable (and persuasive) arguments," Pet. App. 15a, FERC did not ignore the risk of "overcompensating" negawatts, whether by simply paying LMP for DRR products in wholesale markets, or paying more for negawatts than wholesale buyers would save as a result of negawatts' availability, Pet. App. 91a–95a (explaining decision to impose two conditions on compensation of dispatched DRR at LMP).

Rather, FERC considered several options, including LMP-G, and explained its reasons for ultimately adopting allocation of a charge per unit

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[18] Comments of Robert J. Borlick, Energy Consultant, FERC Docket No. RM10-17-000, at 7 (May 13, 2010) (arguing for LMP-G on the grounds that DRR is best understood as the unexercised call option of a curtailing end-user, and payment for such an "option" should subtract its "strike price"); *see also* Demand Response Compensation in Organized Wholesale Energy Markets (Supplemental Notice of Proposed Rulemaking and Notice of Technical Conference), 75 Fed. Reg. 47,499, 47,500–01 (Aug. 6, 2010) (conference prompted by commenters' overlapping concerns about overpayment and cost allocation).

purchased (i.e., the adder) across all buyers and the Net Benefits Test to exclude DRR that would not be cost-effective to buyers. *Id.* at 91a–95a (explaining adoption of Net Benefits Test), 126a–129a (explaining choice from among five methods for allocating adder).[19]

Compensating DRR at LMP-G would lead to unjustified price discrimination. The value of "G" depends on diverse state regulations that affect the marginal costs of supply resources. Thus, the argument for compensating dispatched demand reduction at LMP-G implicitly requires FERC to take into account the effect of state regulations on the marginal costs of DRR but no other supply resources sold in wholesale markets. Applied to the DRR product alone, this is economically discriminatory. Applied across the board, this would make FERC responsible for offsetting the effects of myriad state programs, ranging from renewable portfolio standards to tax credits for particular installations to state preferences that favor a particular type of fuel. FERC does not do this, and for good reason. It would present a significant informational challenge, and it would

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[19] Amid the flurry of comments, responses, and reasons ultimately given by FERC for its decision, the Net Benefits Test and LMP-G came to occupy the positions of pseudo-substitutes. It would oversimplify to say that FERC chose between them to address the potential problem of "overcompensation," but it is accurate to say that both were proposed as ways to avoid paying too much for DRR. *See, e.g.*, Order 745, Pet. App. at 86a–87a & 117a (commenters argue that LMP-G obviates Net Benefits Test).

improperly orient FERC's maintenance of "just and reasonable" rates within its jurisdiction to decisions made by other regulators outside its jurisdiction.

FERC relies on wholesale market prices and quantities exchanged to determine economic efficiency. Any requirement from FERC that wholesale markets should take the cost implications of diverse state regulations into account when valuing wholesale supply resources would result in unjustifiable discrimination among resources and impede the normal operation of wholesale markets. What's more, importing a non-marginal sunk state regulatory cost effect into competitive wholesale markets would make wholesale market outcomes less economically efficient, and it would also be a clear contravention of FERC's responsibility to ensure that wholesale markets yield just and reasonable outcomes by eliminating non-economic considerations and influences.

Consider also that *not* compensating cost-effective DRR at New LMP would mean inviting wholesale market participants to pay less than that DRR is worth and thereby to free-ride on the investments made by its providers. Order 745 eliminates such free-riding concerns by ensuring that those who benefit from a lower New LMP also pay for the cost-effective dispatched demand reduction that caused LMP to be lower. Paying less than New LMP would also cause an economically inefficient amount of DRR because the Net Benefits Test limits only permits dispatched demand

reduction in wholesale markets to earn New LMP if it has a lower marginal cost than the electricity it displaces.

LMP-G would not avoid "overcompensation" or undercompensation. Unlike applying the Net Benefits Test, simply reducing LMP by "G" would not avoid some situations where wholesale buyers pay for dispatched demand reduction but receive no net benefit. This conflicts with a basic premise of the LMP-G approach, namely that it would prevent paying more for DRR than it is worth to wholesale market participants.

The flip side of this point is no less important: in addition to sometimes overcompensating DRR providers, LMP-G would frequently also undercompensate them, causing them to stay out of wholesale markets and, in turn, causing wholesale market participants to pay more than they would if cost-effective DRR products were available. This is inefficient, and it unfairly discriminates in favor of megawatt hours and against operationally equivalent negawatt hours.

LMP does not lead to "double payment" for DRR products. Some of Order 745's critics insist that compensating DRR providers at LMP means paying them twice, once in the form of saving on electricity not purchased, and again by receiving a payment of LMP This is simply wrong. When wholesale market participants pay LMP for dispatched demand reduction in wholesale markets, no one is paid twice. End-users that give

up some measure of control over their electricity use typically receive price discounts for the electricity they consume.[20] Another entity, such as a utility or energy service provider, effectively pays the end-user an amount equal to those discounts.[21] That intermediary entity must attempt to recover its costs from the wholesale market, which it can do when the aggregated demand reduction it bid into the market is selected, dispatched, and paid for by wholesale electricity buyers. The end-users that give up partial load control in exchange for price discounts have no immediate economic stake in the prices paid for and the amount of demand reduction dispatched in the wholesale market. And, the intermediary utility or energy service provider makes or loses money based on whether the wholesale market prices for dispatched demand reduction exceed what it paid in the form of discounts to end-users plus what it invested in the capital and organizational assets that enable it to aggregate demand reduction for dispatch. Thus, it might be fair to say that two payments are made—one via wholesale markets to intermediaries, and one via the intermediaries' contracts with end-users—but neither of those parties receives both payments. This is no different than electricity

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[20] Nationwide retail tariff specifications are diverse, but those that invite retail customers to accept supply interruption or agree to load control generally provide discounts or compensation not available to nonparticipating customers. *See* Cappers et al. (2010), *supra* note 15, at 1526–27.

[21] Large industrial end-users that buy directly from wholesale markets are an exception to this point.

where generators receive payment for megawatt hours sold into wholesale markets, and intermediary utilities or energy service providers purchase the electricity from wholesale markets for the purpose of reselling it to retail customers.

III. The Fundamental Economic Issue in this Case Is How Best to Encourage Competition and Efficiency in Wholesale Markets.

FERC's effort to find efficiencies in wholesale markets by clearing a path toward buying less electricity and more DRR is no mere intellectual exercise. This Court's decision about whether to allow that effort to proceed will inevitably make some wholesale market participants winners and others losers. That fact informs not only who is arguing before this Court but also the arguments they choose to present. Most notably, those who stand to lose from implementation of FERC's Order have reason to frame it as FERC's attempt to boost the price to be paid for DRR beyond what maintaining "just and reasonable" pricing allows.

From the viewpoint of an economist concerned with the efficient operation of wholesale electricity markets, the underlying debate in this case is not solely about finding the right *price* for DRR. It also concerns the correct—meaning the economically efficient—*quantity* of both megawatt and negawatt hours. Accordingly, the economic question at the root of this case is whether and under what terms to allow and encourage

competition between alternatives that ISO/RTOs—using the Net Benefits Test and other means—insure are economically efficient operational substitutes.

Economic efficiency increases, and society benefits, when customers have more choices and entrepreneurs are free to take risks and enter markets occupied by incumbents on a level playing field. Currently, most electricity generated in the U.S. is acquired in the wholesale markets managed by ISO/RTOs. Some states are encouraging and/or allowing retail energy service providers and firms that provide energy management services on customer premises to engage with end-users beyond their electricity meters—that is, regarding end-users' use of heating and cooling systems, lighting, and other electrically powered equipment.[22] FERC's Order facilitates such efforts by enabling DRR providers to translate the efforts of those end-users who are willing and able to use

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[22] Examples of such engagement are diverse, ranging from traditional load interruption arrangements, to pre-cooling and other HVAC use adjustments in commercial buildings, to installing smart appliances that adjust electricity usage based on price signals relayed by a smart meter or a retail energy service provider. *See* New York State Pub. Serv. Comm'n, Staff Report & Proposal: Reforming the Energy Vision, Case No. 14-M-0101, at 38–41 (Apr. 24, 2014) (summarizing current and potential roles of energy service companies or ESCOs in managing energy use by end-user facilities and buildings); *see also generally* Electric Power Research Institute, Smart Grid Demonstration Initiative: 5 Year Update (2013) (presenting diverse examples of such engagements).

electricity more efficiently into cost-effective DRR in wholesale markets, and thereby lower LMP

When ISO/RTOs dispatch cost-effective demand reduction, everyone is better off except generators, some of which are dropped from the supply stack because they are uneconomic (although dropped generators do avoid higher marginal operating costs). Others with lower marginal operating costs still supply electricity but earn a lower economic rent because competitive market prices are lower. Thus, in general, generators lose as DRR provider participation increases, and with it wholesale market efficiency. Nonetheless, no supplier should be guaranteed any economic rent, which, in competitive markets, should guide more efficient future decisions by signaling when to invest in competing products or services, whether they draw their value from changes to energy use on end-users' premises or from supply-side resources with lower operating costs, such as nuclear plants or wind farms.

CONCLUSION

For the foregoing reasons, amicus encourages the Court to recognize that Order 745's prescription for compensating cost-effective demand response that can be dispatched, measured, and verified stands on sound economic principles and coherent reasoning. As it is logically valid, and as FERC has made its logic clear, Order 745 cannot be considered arbitrary and capricious

and the decision of the D.C. Circuit should be overturned. More practically, the Court should also reverse the decision below because FERC's Order promises to be a source of efficiency in wholesale markets, both in terms of energy and economics.

Respectfully submitted,

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